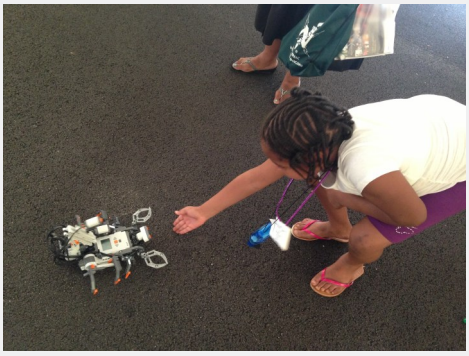
Whiting School of Engineering, The Johns Hopkins University

LCSR NEWSLETTER

Newsletter from The Laboratory for Computational Sensing and Robotics FALL 2013

FOSTERING INNOVATION THROUGH STEM OUTREACH



STEM Nation-African American Festival
Photo Credit– Kerron Duncan

Tours for Students
Photo Credit– Anita Sampath

Research Experience for Undergraduates Program
Photo Credit– Anita Sampath

True to its mission of creating knowledge and fostering innovation, LCSR is broadening its reach with several community and education programs. LCSR has been committed to Science, Technology, Engineering, and Math (STEM) outreach to the K-12 group as well as college-age students. The core of LCSR's outreach programs include the National Science Foundation funded Computational Sensing and Medical Robotics Research Experience for Undergraduates (CSMR REU) program, the annual Johns Hopkins Robo Challenge, and regular hands-on lab tours for students from various age groups. The REU program has been organized every summer for over a decade. Students from various universities across the United States spend 10-weeks in LCSR working on cutting-edge research projects and interacting closely with faculty mentors and graduate students. Over 60% of the participants in this program have gone on to graduate programs in a STEM field or Medical School. Close to 25% of program participants have been from underrepresented minority groups.

The Johns Hopkins Robo Challenge for middle and high school students offers free registration and loaner robotic kits to student teams that cannot afford to invest in expensive robotics kits. The graduate students in LCSR host a training session for teachers and students who are new to robotics. Over the years, several teachers with no experience in robotics have started robotics teams in disadvantaged schools with support from students in LCSR and have participated in the Johns Hopkins Robo Challenge. In addition to hosting the in-house competition, LCSR students also volunteer at other Robotics Outreach events in the greater Baltimore area. LCSR's state-of-the-art labs are regularly used to showcase projects to young students, to motivate them to take up careers in STEM fields.

Staff from LCSR volunteer at the Pre-K at Play event hosted by Hopkins's School of Education for Baltimore City Public School students thus reaching children at an early age. The goal of this event is to bolster early learning through hands-on science projects. In the summer of 2013, graduate students from LCSR had interactive demonstrations of robots in the STEM Nation section of the African American Festival held in Baltimore. LCSR hosts high school students throughout the year providing them with unique project experiences. Recently, three students from the Baltimore Polytechnic Institute joined LCSR and will be mentored throughout the year by faculty and graduate students. Using its expert STEM community, LCSR is shaping the next generation of engineers and scientists.

To support LCSR's outreach initiatives, please contact Anita Sampath at asampath@jhu.edu

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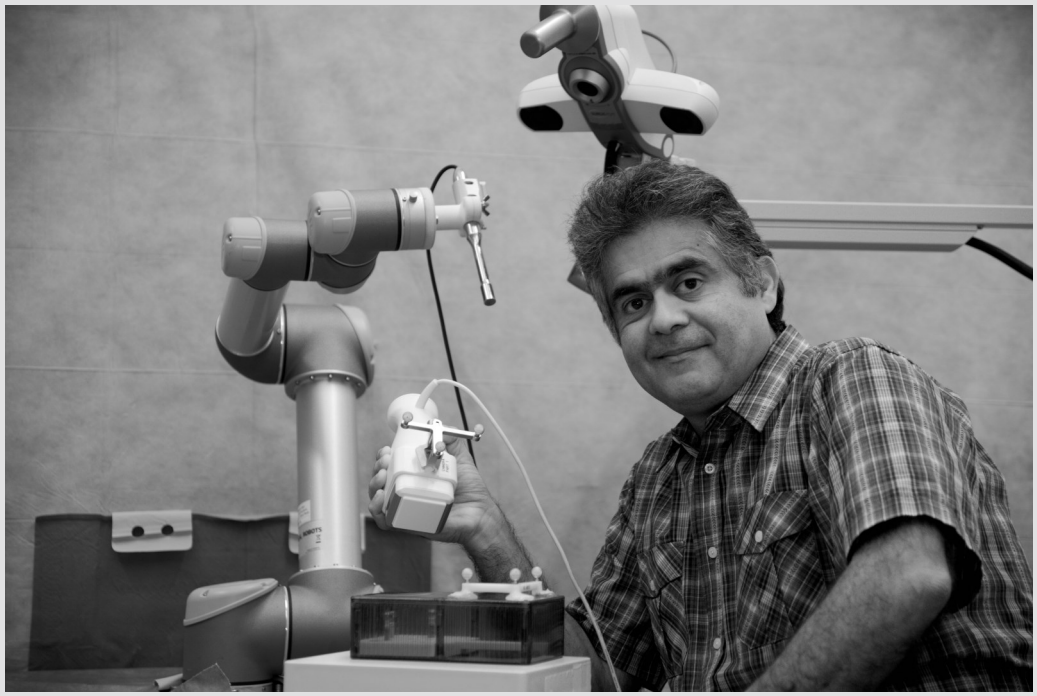
FACULTY PROFILE
INTRODUCING DR. NASSIR NAVAB



Prof. Nassir Navab
Photo Credit-José Gardiazabal

Born and raised in Iran, Nassir Navab did his university studies in France. He got introduced to the field of Image Processing and Computer Vision by the late Prof. Azriel Rosenfeld during his master's project at Center for Automation Research at University of Maryland. Nassir completed his PhD from University of Paris XI in the group of Olivier Faugeras at INRIA in January 1993. His PhD at INRIA and his post-doctoral studies at MIT Media Laboratory were focused on Computer Vision. Nassir joined Siemens Corporate Research in November 1994 and moved his focus to interventional imaging and augmented reality during the 90s. In 2001 he received the Siemens Inventor of the year award for his contributions to interventional imaging and was appointed as the speaker of the steering committee of IEEE ISMAR. In 2003, Nassir got a chair position at Technical University of Munich and formed the institute for Computer Aided Medical Procedures and Augmented Reality (CAMP-AR). Founded in 2003 the group grew to around fifty members in 2010 and positioned itself as one of the leading institutes in Medical Image Computing and Computer Assisted Interventions. Nassir received the SMIT Society Medical Innovation Award in 2010 for his inventive contributions towards two novel intra-operative imaging technologies, the Camera Augmented Mobile C-arm (CAMC) and Freehand SPECT.

Nassir joined the faculty of computer science at Johns Hopkins University in July 2013 to create a new joint center of research between TUM and JHU. The complementarity of the two institutes and educational systems and the strength of the German medical technology joint with the excellence in medicine and medical technology at JHU could provide a unique opportunity for design and development of novel technologies impacting the future of our healthcare. In addition to interventional and intra-operative imaging, Nassir is known for his research on Medical Augmented Reality and Surgical Workflow Analysis. Nassir is a Fellow and Member of board of directors of MICCAI society. At JHU he is hosted by LCSR and aims at close research partnership also with Radiology and Surgery departments.
To learn more :-http://campar.in.tum.de/Main/NassirNavab

LEADERSHIP CHANGE IN LCSR

Professor Russell Taylor, Director of the Engineering Research Center for Computer-Integrated Surgical Systems and Technology and Professor of Computer Science became the Director of the Laboratory for Computational Sensing and Robotics. He took over the position from Professor Louis L. Whitcomb who will be chairing the Mechanical Engineering Department at the Johns Hopkins University. Dr. Taylor also directs the Computer Integrated Interventional Systems Laboratory at the Johns Hopkins University.

Prof. Russell Taylor
Photo Credit-Homewood Photography

GLOBAL CONNECTIONS—FOCUS ON GERMANY

Sebastian Riedel, an exchange student from Technical University of Munich with Professor. Gregory Hager in LCSR. Photo Credit: Homewood Photography

In the summer of 2013, three exchange students from LCSR traveled to Germany to work on novel projects at the International Graduate School of Information Science in Health (GSISH) in the Technical University of Munich (TUM). GSISH belongs to the German Medical Imaging in Motion (GMIM) consortium of research universities and industrial partners. This consortium aids in international collaborations and is supported within the framework of "Research in Germany-Land of Ideas" initiative of the German Federal Ministry of Education and Research.

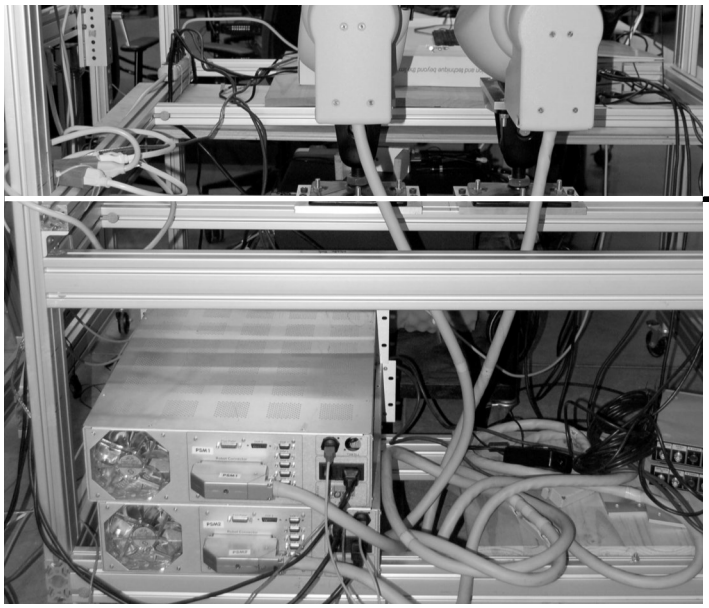
Kevin Olds, a graduate student in LCSR, collaborated with Professor Tim Lueth at TUM. Professor Lueth directs the Micro Technology and Medical Device Technology Lab. Kevin worked on developing a disposable instrument manipulator for controlling endoscopic instruments using a Rapid Manufacturing technique during his 6-weeks stay in Germany. Christopher Paxton also a graduate student in LCSR, worked with Professor Darius Burschka on the ***"Pedestrian Intention Recognition"*** project whose goal was to identify which pedestrians were at risk of stepping out in front of a moving driverless car. Dr. Burschka heads the Virtual Institute for Telerobotics and Sensor Data Fusion, a collaboration between TUM and DLR (German Aerospace Center).

Paul Wilkening joined forces with Professor Alois Knoll and worked on the "***Robot-Assisted Microscopic Manipulation for Vitreo-Retinal Ophthalmologic Surgery"*** project. All three exchange students were funded by the National Science Foundation.

Graduate students from TUM have also had opportunities to travel to Baltimore to collaborate with researchers in LCSR. Sebastian Riedel, a graduate student from TUM, spent close to a year in LCSR's Computational Interaction and Robotics Lab (CIRL) headed by Prof. Gregory Hager. Sebastian worked on a project that would enable a standard industrial robot to handle regular human hand tools and provide various means to assist a human while performing small lot wood working tasks like drilling and sanding. In addition he also collaborated on a 3D scene parsing framework that validates detected objects by additionally considering physical and temporal consistency.

These international collaborations and exchanges facilitate new and diverse technologies to be developed at a rapid pace because of the combination of expertise and knowledge from labs in different continents and input from industrial partners. To learn about partnering with LCSR, please visit https://www.lcsr.jhu.edu/Partnerships_Program

Kevin Olds (with hat) along with members of the Micro Technology and Medical Device Technology Lab in Germany. Photo Credit– TUM Germany



New Open-Source Electronics and Software to Control research da Vinci Systems

Researchers in LCSR along with collaborator Dr. Gregory Fischer from Worcester Polytechnic Institute have developed open-source electronics and software to control research da Vinci systems created from retired first-generation clinical systems. Dr. Peter Kazanzides (Director of the SMARTS lab), Anton Deguet (Research Engineer in LCSR) and Zihan Chen (graduate student in LCSR) worked to develop a FireWire-based controller and open source software. The controller enclosure was developed by Dr. Fischer. This system has been disseminated to several research institutions, including the Johns Hopkins University, Worcester Polytechnic Institute, Stanford University, the University of British Columbia, Vanderbilt University, University of California at Berkeley, Carnegie Mellon University, SUNY Buffalo, University of Western Ontario and the Sick Kids Children's Hospital (Toronto).

To see a YouTube video: http://www.youtube.com/watch?v=0n_9CgNSx6Y

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Please send comments and story ideas to Anita Sampath

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Graduate Students in LCSR. Photo Credit– Homewood Photography

NEW MSE PROGRAM LAUNCHED IN FALL 2013

The faculty of the LCSR, in collaboration with the academic departments and centers of the Whiting School of Engineering, launched a Master of Science in Engineering in Robotics in order to provide a structure in which students from a wide variety of engineering, scientific, and mathematical backgrounds can advance their interdisciplinary knowledge in robotics at The Johns Hopkins University.

To Learn more about LCSR's MSE Program:-
https://www.lcsr.jhu.edu/MSE